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ABSTRACT

Computers are intrinsically fascinating to students once they learn what materials are available and become familiar with working on the terminals. The Plato Health Science Network contains an extensive catalog of lessons of interest to medical students and is available to anyone on request; this has resulted in several hundred hours per week of lesson usage. A by-product of this high usage is that students become interested in creating lessons by authoring scripts and programming the computer. Historically this student interest has been discouraged as irrelevant to the process of becoming a physician. However, because of student persistence, such participation has come to be accepted and even encouraged by the staff of the Medical Plato Project. Student participation in authoring has resulted in a substantial number of quality additions to the clinical offerings of PLATO. Specific examples of student work are described, including projects in progress or planned. In addition, contributions of student authors toward faculty involvement in CAI are noted. (Author/VT)

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MEDICAL STUDENT AUTHORING OF MEDICAL LESSONS ON PLATO

by

Charles D. Nelson

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Medical Student Authoring of Medical Lessons on PLATO

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ABSTRACT

Computers are intrinsically fascinating to students once they learn what materials are available and they master the mumbo-jumbo associated with signing in. The Plato Health Science Network contains an extensive catalog of lessons of interest to medical students and is available to anyone who requests, resulting in several hundred hours per week of lesson usage.

A by-product of this high usage is that students become interested in creating lessons both by authoring scripts and by programming the computer. Historically this student interest has been discouraged as irrelevant to the process of becoming a physician. However, because of student persistence, their participation in the lesson-writing process has come to be accepted and even encouraged by the staff of the Medical Plato Project.

Student participation in authoring has resulted in a substantial number of quality additions to the clinical offerings of Plato. Specific examples of student work are described along with projects in progress and planned. In addition, contributions of student authors toward faculty involvement in CAI are noted.

INTRODUCTION

Computer Assisted Instruction at the Abraham Lincoln school of Medicine is used "smorgasbord style" for the most part, at the student's own initiative. Computer lessons are rarely assigned

as class work. Since medical students are acutely aware of the necessity to pass the year-end comprehensive exam, however, they make good use of available computer lessons which fulfill their educational needs, just as they make good use of available lectures, textbooks, and clinical experiences.

The CAI system used at the College of Medicine is Plato, a nationwide network of terminals connected to a Control Data Corporation Cyber 73 at the University of Illinois in Champaign-Urbana. Twenty-two plasma-graphics terminals are available for student use at the Chicago Medical campus, in eight locations including the Health Science Library, a student study area near the classrooms, a learning resource area, and five Chicago teaching hospitals. Each student receives a personal signon. Upon keying in this signon, he sees displayed on the terminal screen the "Plato Health Science Network" main index. From this display he chooses various categories of lessons to study. Altogether he can access over 500 Plato lessons, ranging from the differential diagnosis of a pregnant diabetic to how to author a lesson on Plato.

Student usage of Plato lessons is increasing. In the school year 1975-1976, medical students logged 4504 hours of academic use at Chicago. In 1976-77, 7468 hours of academic use were logged. In 1977-78, as of mid-October, 2902 hours of use have been logged, for a projected total year usage of about 14,500 hours.

A number of reasons exist for this high rate of usage:

- there is a selection of several hundred lessons available on the catalog;
- terminals are widely and easily accessible;
- periodic mailings and a freshman orientation make students aware of this resource;
- word of mouth among students generates interest;
- Plato is intrinsically fascinating to students;
- Plato fulfills educational needs. Not only do students currently studying at the College of Medicine use Plato, but also future students: last year soon after acceptance letters went out for the new class, several premeds called to find out if they could get Plato signons before classes began six months hence.

HISTORY OF MEDICAL STUDENT AUTHORING

Concomitant with student interest in existing Plato lessons in the early days of the Plato medical project came student complaints about areas of the curriculum with insufficient coverage, student ideas for new lessons, and student interest in authoring. However, student overtures were not received favorably. Administrators felt that Plato could not be expected to cover the full range of the medical curriculum, that students did not have the background to suggest new lessons, and that future doctors had more important things to do than write up computer lessons, even medical computer lessons.

Despite such skepticism, students found their way into the lesson-writing structure. A pediatrician at one of the teaching hospitals called and said he wanted to write a Plato lesson -- could he have space, a signon, and a manual? No, he didn't want to talk to a programmer or an instructional designer; he had all the help he needed: a medical student was working with him.

In fact, of course, the medical student did the whole lesson -- the pediatrician just verified the technical data. Their lesson, added to the medical catalog despite experienced advice, became one of the most popular clinical lessons on Plato for the next two years. The previously prevailing accepted "format of choice" for clinical decision-making exercises was never used on Plato again. However, a dozen lessons were written in the next two years using this new format, and a dozen new formats were spawned in the wake of this tradition-defying innovation. As for the validity of this new instructional design: it has been adopted for a new program of continuing medical education on Plato at the University of Illinois.

Gradually the staff of the Medical Plato Project realized that student authoring was not necessarily an evil. In fact, the staff found that it could accomplish several major goals by encouraging students to author Plato lessons:

1. Student utilization of the terminals would increase.
2. Areas of need in the CAI curriculum would be diagnosed.
3. Use of CAI in medical education in the long run would be encouraged, since today's students are tomorrow's teachers.
4. Available formats would be expanded by tapping the creative imagination of highly educated, talented, and internally motivated users.
5. Faculty participation would increase, at least their level of awareness of Plato activity, since students would be calling on faculty to review their programs.

METHOD

When Plato staff determined in late 1976 that student authoring was worth encouragement, they immediately established some authoring procedures for students to follow and publicized these procedures. The staff decided that students must have a faculty sponsor. This rule discourages gamers, involves faculty, and inhibits weaker students from escaping their rigorous medical studies in the labyrinth of programming. Rules were written up and incorporated into an agreement students must sign to secure their author privileges (see Appendix).

In addition, all publicity about Plato was rewritten, such as student handout sheets, an introductory computer program, and bulletin board postings, to promote student authoring. All students on campus received a flyer including an invitation to learn about authoring.

At the incoming student orientation meeting in Autumn, 1977, authoring was mentioned in the course of the usual introduction to Plato in medical school. Periodic student mailings will continue to mention authoring. When students seek out the Plato office and ask questions, their interest in creating programs is always assessed. Such efforts, coupled with the intrinsic attractions of Plato as an intricate machine and a "typewriter that talks back" have attracted numerous student authors, including student government leadership.

The Plato staff offers interested students programming assistance and instruction, manuals, help on proposals and reviews, and printout facilities for files being worked on. The staff has also responded to student requests for more terminals, terminals in more convenient locations, and for longer hours such as access on Sunday morning.

RESULTS

In the 1974-75 school year one medical student wrote a clinical simulation about the differential diagnosis of pediatric gastro-intestinal hemmorhage. It was enthusiastically received by users of the Plato Medical Network. As a result of student efforts, therefore, one faculty member became involved in lesson development.

In the 1975-76 school year, eight medical students worked in lesson development and completed three clinical lessons. Two of these lessons used the format developed the previous year by a student, with the script being written by students and the programming done by the Plato staff. One was a diagnostic simulation of "The Malabsorption Syndrome" in medical pathology; the other was a diagnostic simulation of a patient with a brain tumor, in the area of nuclear medicine. The third lesson was programmed by the student himself using a format of his own design, and all the content was provided by the student. As a result of these efforts, six faculty members became involved in lesson development on Plato, and in turn involved their colleagues.

In the 1976-77 school year, nineteen students became involved in authoring lessons at the Chicago campus. Five lessons were completed in the course of the year, and six more were finished during the summer. Fifteen additional faculty members learned of Plato through these student efforts, and four faculty wrote Clinical Simulations for Plato to further expand the material available on the Medical Catalog.

The lessons written by students reflect a broad range of topics and formats. One first year medical student who had an undergraduate computer science major wrote a lesson about interpreting electrocardiograms.

He devised his own interactive format and the lesson received substantial use, filling a particularly acute gap in the catalog.

Another student wrote a laboratory simulation about the use of enzyme assays in diagnosis which included a number of didactic help sequences, a "Hall of Fame" for top scores, and the highly interactive quality of gaming. Users of the lesson can play at four levels of expertise, with varying specificity of clues provided at each level. Scores can be stored in the Hall of Fame only if the user is playing at the highest level.

A third lesson resulted when two student government leaders undertook a comparative survey of the quality of student experiences in ten teaching hospitals affiliated with the University of Illinois. Students rated these hospitals on 63 dimensions such as quality of teaching, facilities available, and type of experience. The student government officers, along with a third medical student who is an experienced Plato programmer, then wrote a lesson which allows students to compare up to three hospitals on given dimensions, or to compare two hospitals with the average ratings of all hospitals. Data are available either in raw responses, in percents, as numbers or as histograms. This lesson is heavily used in the Autumn quarter when the clerkship lottery determines which students will be assigned to which hospital. (Note: new data were provided for the 1977-78 school year to enable comparison with the 1976-77 data). It is important to emphasize that this lesson was conceived and programmed by students and that the data were gathered by students as well. In fact the Plato staff became aware of this lesson only after the work was done and the students wanted to have it added to the catalog.

Another lesson conceived by a student and programmed by him is a "Medical Ethics Simulation" consisting of a number of moral dilemmas confronted by physicians, such as teenage sex and contraception, diagnosis of terminal illness, and use of drugs. Many of these dilemmas have no right or wrong answer, nor do they have any certainty of outcome. Students in going through the lesson are called on to choose from a number of alternatives to resolve an issue. Feedback to the student about the problem's outcome is randomly selected to simulate the outcomes of similar situations in real life. Cumulative statistics are kept on choices made by the lesson users

so that a cumulative profile of student ethics as measured by the lesson is available.

Other student lessons include a game type of interactive drill on generic names and brand names of drugs, particularly important to clinical students because of the multiplicity of terms currently used and being introduced; a series of scripts about the diagnosis and management of patients in orthopedic surgery; a University Medical Student Council Newsletter utilizing the unique capabilities of Plato's notefiles for inter-terminal discussion; a lesson about the diagnosis and management of hypertension; a lesson about glycogenolysis; and a lesson about pediatric cardiology. These lessons, like all lessons added to the Plato Health Science Network catalog, will of course undergo review both to insure factual accuracy and to certify that no programming errors interfere with their use.

In the 1977-78 school year, as of October 1, 33 students are involved in writing and programming Plato lessons. Of these students, eight have completed at least one lesson which was added to the Plato Health Science Network catalog in the last year. Six new lesson proposals have been accepted so far this year, in addition to a large number of carry-over projects from past years. Four first year students are still working on their introductory programming exercise, but they all have concrete ideas about a project they wish to complete, ranging from simulating a patient with perceptual deficit to a startrek-based inter-terminal game between viruses and bacteria in the bloodstream rather than between Klingons and Romulans in the universe,

CONCLUSIONS

Faculty and administration often approach Computer Assisted Instruction as a tool to remediate academic deficiencies among disadvantaged students. They usually do not anticipate that "better" students will become involved in CAI both as consumers and producers of courseware. Our experience has been that disadvantaged students use Plato, much as other students do, and in about the same intensity as they use the library or other study aids.

However, just as better students stand out in class discussions, in lab work, in independent study, or on rounds, so do they stand out in the medium of CAI. Furthermore, due to the infancy of CAI and its inchoate institutionalization into the curriculum, there are as yet no set limits to its uses. Thus student programmers in this new and experimental medium are free to innovate and explore the limits of expression which can be attained. That widely diverse formats have come forth and new types of computer applications to medical education have multiplied attests to the efforts and genius of the medical students who have found their way to author mode on Plato.

APPENDIX
RIGHTS OF AUTHORS

1. Any Medical student at the University of Illinois may obtain an author signon by meeting the following conditions:

a) obtain a faculty sponser who will agree in a letter to supervise your development of lessons on Plato and oversee the content of your lessons for accuracy and clinical relevance.
b) sign the University of Illinois Author agreement forms.
c) sign this form upon receipt of your signon indicating your acceptance of the obligations.

2. Authors are entitled to a work file as long as they remain in good standing.

3. Programming assistance is available in the form of the two TUTOR manuals, on-line consultation, and face-to-face help from CED programmers where possible.

OBLIGATION OF AUTHORS

1. Authors agree never to enter a lesson without the permission of the author of that lesson.

2. Authors agree never to execute lessons on the medical catalog using their author signon. In order to properly keep data, the student signon should always be used for instructional lessons including the medical notefiles.

3. Authors agree NEVER TO PLAY GAMES DURING PRIME TIME. Infractions of this rule may result in one months suspension of author privileges.

4. Authors agree never to write obscene, derogatory, or libelous notes in the note files or through the comment or talk options.

5. Authors agree never to use any signon except their own.

6. Authors must never lend their signon to anyone.

I, _____, agree to the conditions stated above and promise to abide by the rules and regulations of PLATO in using my author signon.

X _____

Date: _____